

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To: Mr. Mikio HATTA

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PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing
(day/month/year) 14. 12. 2004

Applicant's or agent's file reference
F 04-047-PCT

FOR FURTHER ACTION
See paragraph 2 below

International application No.

PCT/JP2004/014213

International filing date (day/month/year)

29. 09. 2004

Priority date (day/month/year)

29. 09. 2003

International Patent Classification (IPC) or both national classification and IPC

**Int. Cl.⁷ C12P7/24, C07C29/141, C07C31/20, C07C45/65, C07C47/22, C07C51/235, C07C59/01,
C07C67/39, C07C69/653, C12P7/18, C12P7/40, C12P7/42, C12P7/62, C07B61/00**

Applicant

Nippon Shokubai Co., Ltd.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/JP
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Chiyoda-ku, Tokyo 100-8915

Date of completion of this opinion

25. 11. 2004

Authorized officer

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Box No. 1 Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
☐ This opinion has been established on the basis of a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1 (b)).
2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material
☒ a sequence listing
☐ table(s) related to the sequence listing
 - b. format of material
☐ on paper
☒ in electronic form
 - c. time of filing/furnishing
☒ contained in the international application as filed
☐ filed together with the international application in electronic form
☐ furnished subsequently to this Authority for the purposes of search
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

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Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1 - 8	YES
	Claims		NO
Inventive step (IS)	Claims		YES
	Claims	1 - 8	NO
Industrial applicability (IA)	Claims	1 - 8	YES
	Claims		NO

2. Citations and explanations:

Citation 1: Vancauwenberge, J.E. et al., "Bacterial conversion of glycerol to beta-hydroxypropionaldehyde"
Appl. Environ. Microbiol., (1990), Vol.56, No.2, pp.329-332

Citation 2: Slininger, P.J. et al., "Optimizing aerobic conversion of glycerol to 3-hydroxypropionaldehyde"
Appl. Environ. Microbiol., (1985), Vol.50, No.6, pp.1444-1450

Citation 3: Slininger, P.J. et al., "Production of 3-hydroxypropionaldehyde from glycerol"
Appl. Environ. Microbiol., (1983), Vol.46, No.1, pp.62-67

Citation 4: JP 5-213800 A (Degussa AG), 1993.08.24

Citation 5: JP 2000-154164 A (Mitsui Chemicals, Inc.), 2000.06.06

Citation 6: Skraly, F.A. et al., "Construction and characterization of a 1,3-propanediol operon"
Appl. Environ. Microbiol., (1998), Vol.64, No.1, pp.98-105

Citation 7: Tobimatsu, T. et al., "Identification and expression of the genes encoding a reactivating factor for
adenosylcobalamin-dependent glycerol dehydratase"
J. Bacteriol., (1999), Vol.181, pp.4110-4113

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of: **BOX V**

(Description)

1. Regarding Novelty and Inventive step

Cited Reference 1 discloses a method for producing 3-hydroxypropionaldehyde (hereinafter, referred to as 3-HPA) from glycerin using bacteria belonging to Klebsiella genus and Enterobacter genus. Further, it also discloses that a biomass concentration of 14.5 g/L showed an increased production amount of 3-HPA compared with that for the case of 3.10 g/L (see Fig. 4).

Cited Reference 2 discloses a method for producing 3-HPA from glycerin using bacteria belonging to Klebsiella genus. It also discloses that when a biomass concentration is varied from about 1 g/L to about 14.5 g/L, production speed of 3-HPA linearly increases up to a certain concentration.

However, it cannot be said with certainty that in the reactions in the Cited References 1 and 2, the parameter (X/Y^2) as claimed in Claim 1 of the present application is over 10.

Consequently, each of Claims 1 to 8 is recognized to have a novelty.

However, as shown in Table 3 in the present application, a biomass concentration corresponding to a parameter (X/Y^2) in Claim 1 which exceeds 10, is about 10.1 g/L. A biomass concentration of not less than 10.1 g/L has also been used in the Cited References 1 and 2. Further, although from the descriptions in References 1 and 2, the typical values are varied with kinds of a microbial cell to be used and an enzyme to be contained, it can be easily understood by a person skilled in the art that production amount and production rate of 3-HPA can be improved by increasing the biomass concentration within a specific range.

Accordingly, it can be easily thought by a person skilled in the art to use a biomass concentration of not less than 10 g/L. Further, since selection of a microbial cell or a extracted enzyme having a high activity has been commonly done, it can be easily performed by a person skilled in the art that the production reaction of 3-HPA is conducted under conditions where the value of (X/Y^2) exceeds 10.

Cited Reference 3 discloses the production of 3-hydroxypropionic acid, acrolein and acrylic acid from 3-HPA produced by an enzyme reaction (see Figs. 1 and 2). Cited References 4 and 5 disclose a method for producing 1,3-propanediol and an acrylate ester from 3-HPA.

Accordingly, such productions can easily performed by a person skilled in the art.

Cited Reference 6 discloses a gene coding an enzyme which can be used for the reactions in the Cited References 1 and 2. Cited Reference 7 discloses a reactivating factor for the enzyme and a gene coding therefor. Therefore, it can be suitably performed by a person skilled in the art that the reactions disclosed in Cited References 1 and 2 are conducted by using the enzyme and the factor is used in combination.

From the considerations described above, it cannot be recognized that each of Claims 1 to 8 involves an inventive step.

3. Industrial Applicability

Each of Claims 1 to 8 has an industrial applicability.